

Date & Time*	Time since start (hr)	Event	Comment
1/9/14 8:15	0.00	Complaints of odor near Freedom Industries facility	
1/9/14 10:40	2.42	Freedom Industries discovers that MCHM is leaking	The chemical is actually a mixture containing at least 6 constituents, including an odorant reported to smell like licorice.
1/9/14 11:15	3.00	State environmental officials pinpoint the source of the leak	One storage tank was leaking through a hole approximately 1 inch in diameter. Unclear how the State became involved before the leak was reported to the State at 12:05 PM
1/9/14 11:45	3.50	Freedom Industries notifies WV American Water. Plant adds carbon to filters but continues to treat water.	Unclear why GAC was ineffective at contaminant removal (the limited data I saw showed no removal at the Elk River WTP). Both Huntington and GCWW conducted bench-scale studies with PAC and observed removals greater than 80% of MCHM.
1/9/14 12:05	3.83	Freedom Industries reports leak to the State	
1/9/14 16:20	8.08	MCHM detected in finished water	This was probably close to as early as the plant would have discovered that their treatment processes were not removing MCHM (as noted above, they assumed the GAC layer they had on top of a sand filter would remove the contaminant). At this point in the response an Eastman/DuPont lab was using their "percent purity" method to run water samples. My understanding is that this is the in-house method used by DuPont for QC on their product. It still uses the same instrumentation and basic methodology as EPA methods 524 / 8270 (either GC-FID or CG-MS); however, it was not calibrated to dilute aqueous concentrations, and was semi-quantitative at best. Over the next two days, they tweaked the method for the water matrix, developed a calibration curve to make it a quantitative method, and trained a number of analysts. This is the version of the method they rolled out on 1/11 and used for the duration of the response.
1/9/14 18:00	9.75	Do not use notice was issued	The notice was issued about one and a half hours after the plant confirmed that contaminated water was entering the distribution system. This is a pretty good response time. I suspect that they may have started working on a public notification plan earlier in the day (they probably read Jeff's guidance).
1/10/14 8:00	23.75	Federal disaster declaration. FEMA and the National Guard brought in to distribute water.	

1/11/14 8:00	47.75	West Virginia America Water and the State reported that they had a method to detect the contaminant in water. ATSDR/CDC release an official statement that no adverse health effects are expected at concentrations below 1.0 mg/L.	The method used was adapted from a "percent purity method" developed by DuPont/Eastman. It appears that the method is based on EPA method 524 and/or 8270 (both methods for VOCs). It's unclear whether they are using GC-FID, GC-MS, or both. To our knowledge, the method, as applied to MCHM, has not undergone any level of validation. If EPA had been involved, we would have applied the ICLN guidance on validation of laboratory methods for emergency response. ATSDR is supposed to provide documentation to back up the 1.0 mg/L threshold, but I haven't seen it yet.
1/12/14 8:00	71.75	A total of 10 people admitted to the hospital, and 169 treated and released for symptoms that appeared to be linked to MCHM exposures.	Cases started reporting to hospitals on 01/10/14. CDC offered to conduct an epi study, but so far the State hasn't taken them up on the offer. The study described would have explored many of the datastreams we monitor for PHS.
1/13/14 12:30	100.25	Officials report that levels are below 1.0 mg/L and begin lifting the use restriction. Use restrictions were lifted by zones, starting at the zone closest to the plant. The utility posted an interactive map showing which zip codes were cleared. They also issued instructions to building owners with instructions about how to flush their plumbing systems. They cleared hospitals before lifting the use restriction in the surrounding area.	West Virginia America Water and the State developed a sampling and flushing plan. While the plans were not shared with EPA, the basic information about the plans was shared and seemed reasonable. The sampling plan called for collecting 10 samples from each of 175 pressure zones and splitting those samples for analysis at two labs. The utility was very aggressive in lifting the ban - as soon as they had test results indicating concentrations were below 1.0 mg/L (I suspect QA/QC was minimal).
1/13/14 16:00	103.75	Leading edge of the chemical plum reached the confluence of the Kanawha and Ohio Rivers. ORSANC is modeling the flow of the plum and conducting sampling on the Ohio. (www.orsanco.org)	Staff at the utility in Huntington noted that they could smell the odorant in the MCHM mixture.
1/15/14 8:00	143.75	The chemical plum reached Cincinnati and is expected to take 24 hours to pass by.	GCWW closed their intakes as a precautionary measure. They have source water reservoirs with 60 hours of storage capacity.
GENERAL NOTE: Aside from FEMA, the National Guard, and ATSDR, federal partners were generally kept at arms length during the response. Furthermore, once they got the 1.0 mg/L number from ATSDR, their role was reduced to receiving data reports showing that concentrations were below 1.0 mg/L. EPA did receive some data from the State as a courtesy, but was not asked to participate in the response or decision making process.			

*: Some times are estimated.